



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicant : Noboru YANAGIDA

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Group Art Unit : 1713

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Examiner : Judy M. REDDICK

Title : METHOD FOR PRODUCING SAPONIFIED ETHYLENE-VINYL  
ACETATE COPOLYMER

DECLARATION UNDER 37 C.F.R. 1.132

HON. COMMISSIONER OF PATENTS AND TRADEMARKS  
WASHINGTON, D.C. 20231

SIR:

I, Kazuyuki SOMEMIYA, hereby declare:

I completed Master Course at Division of Chemistry in Faculty of  
Science in Kyoto University in March, 1996.

Since joining Kuraray Co., Ltd. in April, 1996, I have been engaged  
for eight years in synthesis of polymers, development of the production  
techniques and development of the production processes.

I am a co-worker of the above-identified inventor.

**Object of the Experiments**

An object of the experiments is to clarify differences between the  
present invention and conventional techniques used in the prior art, by  
confirming the saponification degrees obtained in reactions by typical and  
conventional methods carried out using compositions and temperature  
corresponding to Example 1 in the present invention.

**Methods and Results of the Experiments**

**Experiment 1:**

Into a 1L-autoclave with an agitator, 300 g of a methanol solution  
containing an ethylene-vinyl acetate copolymer (EVAc) (ethylene content in  
the EVAc: 32 mol%; EVAc concentration in the solution: 45 wt%), and 11.5 g

of a methanol solution of sodium hydroxide (sodium hydroxide concentration: 15 wt%, water content: 1.74 wt%) were introduced. The amount of water added to the reaction solutions was about 1500 ppm. The autoclave was sealed and then heated in an oil bath at 120°C. When the interior temperature of the autoclave reached 110°C, the time was set as zero minutes. From the zero minutes, the interior temperature was kept at 110°C and the reaction was carried out for 30 minutes. During the reaction, the pressure in the autoclave was 0.55 MPa. After cooling the interior of the autoclave to 40°C, the contents in the autoclave were taken out and charged into tap water so as to deposit the reaction product. After washing sufficiently the deposited reaction product further with the tap water, the product was dried in a dryer so as to obtain a saponified ethylene-vinyl acetate copolymer (EVOH). The EVOH obtained as described above had a saponification degree of 88.4 mol%.

#### Experiment 2:

An EVOH was obtained by the same process as Experiment 1, except the saponification reaction time was changed from 30 minutes to 5 hours. The EVOH obtained in Experiment 2 had a saponification degree of 90.6 mol%.

#### Conclusion

As described above, when a saponification reaction is carried out in a conventional and typical method, the saponification degree was low, i.e., far below the value of 98%, even when the experiments were carried out by applying the same material ratios and under the same temperature condition described in Example 1 on page 7-8 of the present specification, which is representative of the entire claim. Furthermore, there was no substantial rise in the saponification degree even after a sufficiently long time was taken for the reaction by extending the reaction time from 30 minutes to 5 hours. These differences between the present invention and the prior art methods of saponification are important because it shows the significant increase in saponification when the reaction is performed according to the present invention.

This fact indicates that the saponification catalyst, sodium

hydroxide, is inactivated as a result of adding water to the reaction system, and it apparently indicates that it is extremely difficult to raise the saponification degree to 98% or higher by controlling the reaction conditions in a conventional and typical method. In light of this fact, we consider that obtaining a saponification degree of 98% or higher according to the method of the present invention was unexpected from the techniques known from the prior art.

I, the undersigned declarant, declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18, of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this December 08, 2004, at Okayama, JAPAN

Kazuyuki Somemiya  
Kazuyuki SOMEMIYA